THE WISCONSIN PHYSICIST

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THE WISCONSIN PHYSICIST

University of Wisconsin–Madison

Department of Physics

Vol. 11 No. 1 Fall/Winter 2004–05

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Invitation to all our Friends and Alums of Physics

More information will be coming out later!

Please mark your calendars, come and join us in the Celebration and Dedication of Chamberlin Hall.

Friday, August 12, 2005

9:00 a.m. **Program Begins**

1:30 p.m. Chancellor Wiley's Dedication Ceremony

Saturday, August 13, 2005

Noon Picnic — Lakeshore behind Tripp Commons

Newton apple tree blossoms

FEATURES

• ***Remember to talk to us and send your updates to maclarke@wisc.edu***

Newton apple tree

Chamberlin Hall viewed from the new Chemistry Building addition.

GREETINGS TO PHYSICS ALUMS & FRIENDS

Another year has passed and for the Department, it has been busy with the upcoming move and the many decisions that come with the move. I asked a number of people on campus what they remember most about Sterling Hall and two Sterling Hall events came to light, which I'll share with you.

The first is the Sterling Hall bombing, which has become a legend of the University. I was living in Madison in the late summer of 1970 when four young men, known as the New Year's Gang, plotted and carried out the bombing of the Army Mathematics Research Center which was located in Sterling Hall, as a protest to the Vietnam War. Karl Armstrong came up with the idea and convinced his younger brother, Dwight, as well as David Fine and Leo Burt, to participate in the bombing.

Early in the morning hours of August 24, 1970, the New Year's Gang loaded about 2,000 pounds of ammonium nitrate soaked in aviation fuel into a stolen Ford. The group parked the van below the Army Mathematics Research Center, near a driveway in Sterling. At 3:42 a.m. the bomb exploded. It was powerful enough to knock out windows six blocks away, and police found pieces of the Ford van on top of an eight-story building nearby. Residents of Belleville, thirty miles from Madison, reported hearing echoes from the explosion. In all, the bomb caused about six million dollars in damages, but did surprisingly little damage to the Army Math Research Center. The greatest casualty of the bombing was not the physical damage, but the death of Robert Fassnacht. The New Year's Gang did not intend to kill anyone and thought the building would be empty on a Sunday night. Fassnacht, a physics post doc, however, was working late that night to finish an experiment. His death left the campus shaken with grief and three children without a father.

Local video shops still rent the documentary, *The War at Home*, which discusses the Sterling Hall bombing. Additionally, books have been written about the event, including The Madison Bombing by Michael Morris and Rads by Tom Bates. The antiwar protests of the 60's and 70's have ended in Madison, but we remember those times.

The second memory of Sterling Hall came from an event in 1968, when the body of 18-year-old Christine Rothschild was found behind shrubbery outside of Sterling Hall. Christine entered UW-Madison in 1967 after having graduated from Senn High School in Chicago, Illinois. Her parents and three sisters lived in a modest home on Chicago's North Side, where her father worked as president of a local brokerage firm. Christine had hopes of becoming a journalist after graduation. She was the first victim of the Capital City serial killer. On a dreary May evening in 1968, a male student discovered her body. Investigators theorized that Christine had been killed early that morning while she was out jogging. The coroner ruled that she had died from at least 12 stab wounds to the chest. Due to lack of leads, and in spite of a $5,000 reward to anyone offering information, her case ended up as a "cold case" folder.

If you have other Sterling Hall remembrances, please send them to me and I'll share them in our next issue. The remodeling of Chamberlin continues on schedule with the administrative staff scheduled to move in during the first part of December. I want to thank you for your continued support; please continue to send me your information and news. I hope you'll be able to join us for our Chamberlin Hall Grand Opening Celebration next August 12 and 13, 2005!

Mary Anne Clarke, Editor

(Sterling Hall events taken from www.crime.library.com/serial_killers/unsolved/madison_wi/1.html & www.sit.wisc.edu/~psohandbook/odds/bomb/htm)

VIEW FROM THE CHAIR

The past year — my fourth in this term — again went swiftly by, and there was the usual daunting mix of repetition and novelty. It called to mind a particularly apposite phrase (borrowed from my friend and colleague Francis Halzen) "Plus ca change, plus c'est la meme chose." Things do change and — surprise!! — after the fact they look much the same. (At least a few do!)

Illustrative of the changes: the long-time Dean of the College of Letters and Science, Phillip Certain, retired and, after a summer of searching, Professor Gary Sandefur of the Sociology Department was appointed the new Dean. Dean Sandefur had served as Interim Provost prior to the appointment of Peter Spear, so at least he was familiar with the challenges accompanying his new position. Another example was the retirement of Katharine Lyall and the appointment of Kevin Reilly as the President of the University of Wisconsin System.

Don Reeder

As the Governor and the Wisconsin Legislature continue to confront the structural chasms that have appeared in the state budget, their strategy for funding the University of Wisconsin seems to be to shift from general state funds to tuition and gifts and grants. We hope this trend can be arrested, but there are indications that it will continue, albeit at a slower pace, during the next biennium. Much of the attraction of University of Wisconsin Physics consists of the events and opportunities that are funded at the margin. That is, the state supports only the basic costs

and other funds are needed to provide the amenities, innovation and other "extras."

The end game is now being played out as the contractors put the finishing touches on Chamberlin Hall. You will recall that the portion built in 1912 for the School of Pharmacy has been extensively remodeled for the Physics Department. In general the space looks great, but as everyone knows the "devil is in the details." At this time, the errors both of omission and commission have become apparent. We hope there is sufficient time, money and will to correct them before we move. At this time, we anticipate occupying Chamberlin Hall during the spring semester. You can monitor the situation from afar by visiting our web page (www.physics.wisc.edu).

I would hope you could find it possible to join us in a gala weekend (August 12-13, 2005) intended to celebrate not only the transition of the Department from Sterling Hall to Chamberlin Hall, but also the International (World) Year of Physics. The designation of 2005 as the World Year of Physics is intended to take note of the remarkable year (1905) during which Albert Einstein published his three seminal papers contributing to the areas of relativity, Brownian motions, and the photoelectric effect. On Friday, August 12, we will host a general interest symposium. After lunch, there will be a dedication of Chamberlin Hall by our distinguished alumnus, Chancellor John Wiley. On Saturday, we offer tours of the renovated building, possibly a memory trip to the Farmer's market, and a picnic on the lakeside to renew old acquaintances and just kick back and relax. We would very much enjoy your company. More detail will be available elsewhere on the web and in the mail.

One of the aspects of the department that does remain the same is its continuing evolution and the recognition of the talents and accomplishments of its faculty. Among recent noteworthy events are:

• We welcomed Assistant Professor Marcus Müller to the faculty. Marcus is a theorist specializing in numerical investigations of condensed matter and material science problems. He is another example of an outstanding departmental acquisition deriving from the interdisciplinary cluster hiring program started in 1999 and intended to supplement and extend the departmental research activities.

• Four colleagues are enjoying sabbatical leaves during this academic year; Professor Tao Han intends to pursue his phenomenological investigations (and look after his new baby girl); Professor Franz Himpsel is gazing at the cosmic background radiation while preparing new astrophysics courses. Dan McCammon is intending to visit Goddard laboratory to sharpen his teaching and research skills in x-ray astrophysics and instrumentation. Baha Balantekin intends to follow up on several fruitful collaborations in France with a lengthy period working with colleagues in Japan. He will also teach in Japan — but not in Japanese I am told!

• The IceCube project takes advantage of the Antarctic summer by continuing to deploy strings of detectors. You may recall that the IceCube project is designed to instrument a cubic kilometer of ice at the South Pole that will serve as a very large cosmic neutrino observatory. The project has been extensively reviewed and was approved by the National Science Foundation as a Major Research Equipment (MRE) project. The required expenditure of about a quarter billion dollars is managed at the UW. At this time, the project is on schedule and on budget. We anticipate that the subsequent analysis of much of the data is envisioned to be done within the Department. Professors F. Halzen, R. Morse and A. Karle are the UW leaders in this strong collaboration.

• Dr. Gary Shiu received a CAREER award from the National Science Foundation. Arguably, the most significant development (at least for the future of the department) has been the successful recruitment of the cluster of three faculty members in String Theory and Topology. You may recall that last year I alluded to the search being undertaken together with the Department of Mathematics to establish an interdisciplinary activity concerned with non-local quantum field theories and the geometries and symmetries used to describe them. Last fall we welcomed Dr. Albrecht Klemm of Berlin, Germany and Dr. Aki Hashimoto of the Institute for Advanced Study (Princeton) who joined Gary Shiu from the University of Pennsylvania who arrived a year before. After a period of relative inactivity, we have again fielded an outstanding team in fundamental physical theory.

I was privileged to again preside at the Department's Fifth Annual Awards Banquet held in May, during which I presented two Distinguished Alumni Fellow Awards. The first was to Dr. Anne V. Kinney, who received her undergraduate degree in the department and who is now the Director of the Astronomy and Physics Division of NASA's Office of Space Science. The second was to Prof. David Cline, who received his Ph.D. in the department and for a time was a faculty member at Wisconsin before going to the University of California at Los Angeles. David has had a distinguished career researching experimental particle physics.

Another highlight of the ceremony was the presentation of Distinguished Faculty Fellow Awards to two outstanding former UW faculty members: Professor (Emer.) Keith Symon and Professor (Emer.) Marvin Ebel in recognition of their outstanding and productive careers, filled with contributions to students, both to the department and to physics in general.

Finally, a most deserved recognition was the presentation of a unique Special Recognition Award to Anne Herb in appreciation of a lifetime of service to the Department and to Physics. She was a stalwart companion of our colleague Ray Herb and the two shared their success with the Department in many, many ways. These awards are made in addition to the customary recognition of the outstanding TAs and various others of our excellent graduate and undergraduate students. Details concerning the wonderful evening ceremony are described elsewhere in this newsletter.

After a number of these events, I am amazed and comforted by the interest, support and enthusiasm of our alumni, faculty and friends. I am very proud to count you all in this cadre, and my colleagues join me in thanking you for your past and future activities.

On Wisconsin!

Don D. Reeder, Chair

copenhagen

by Michael Frayn, directed by Richard Corley

— a Madison Premiere and winner of three "Tony Awards," plus University of Wisconsin-sponsored educational "surround" activities.

Presented by the Madison Repertory Theatre at the Overture Center, 201 State Street.

Friday, Oct. 22, 2004 through Sunday, Nov. 14, 2004

Educational "surround" events scheduled for Oct 23, Oct 27, Nov 3, Nov 7 & Nov 9, 2004.

The University of Wisconsin College of Letters and Science and the Madison Repertory Theatre present to the University and greater Madison community a new experience — the blending of science and drama. As an introduction to the celebration of the World Year of Physics 2005 and in recognition of the 100th anniversary of Albert Einstein's "Miraculous Year," several departments, including Physics, Theatre and Drama, History of Science, Philosophy, and Science & Technology, have teamed up to enhance Madison's opportunity to experience an award winning play about science by providing an educational "surround" intended to engage the further interest and concerns of the audience. These activities will range from pre-play and post-play discussions of the history, ethics and effects on today's society to a public panel discussion. *(See detailed calendar of play and educational "surround" events at www.physics.wisc.edu/cope/index.html.)*

The play, winner of three Tony Awards including best play, is a haunting story of friendship and danger. In 1941 the German physicist Werner Heisenberg made a strange, clandestine trip to Copenhagen to see his Danish counterpart, Niels Bohr. Their work together on quantum mechanics and the uncertainty principle had revolutionized atomic physics in the 1920's. But now the world had changed and the two men were on opposite sides in a world war. Scientists and historians always have argued about why Heisenberg went, and what the two men said.

The Tony Award winning play that soars at the intersection of science and art, "Copenhagen" is just an explosive re-imagining of the mysterious wartime meeting between the two Nobel laureates to discuss the atomic bomb. Why "Copenhagen?" Because we are celebrating the World Year of Physics in 2005.

Go to www.physics.wisc.edu for continuing calendar information throughout the 2005 year.

CHAMBERLIN REMODELING NEARING COMPLETION

By Dave Huber

The remodeling of Chamberlin Hall is close to being finished. Later in the fall the Department will begin moving offices, instructional and research labs, and the physics museum from Sterling to remodeled areas in Chamberlin. It is expected that the move will take 6–8 months to complete. Beginning in the fall of 2005, all Physics lectures and classes will be held in Chamberlin. The Department will retain laboratory and office space in the basement of Sterling under the east wing. The remodeling of Sterling has been postponed; in the meantime, the space freed up by the move will be used by other departments and programs.

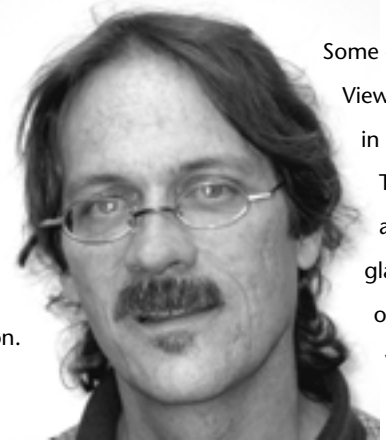
Last spring, the Wisconsin Arts Board held an open competition for new artwork in Chamberlin under the "Percent for Art" program. The commission was awarded to an artist from Mineral Point for a "circular standing wave" bronze and stone sculpture that will be placed on the lawn outside the building.

The Department will re-dedicate Chamberlin Hall as part of a Physics summerfest on August 12, 2005. All faculty, staff, students and alumni are invited. More information about the dedication can be found on page 1 in this newsletter.

New Chamberlin entrance

NEW SCULPTURE FOR CHAMBERLIN

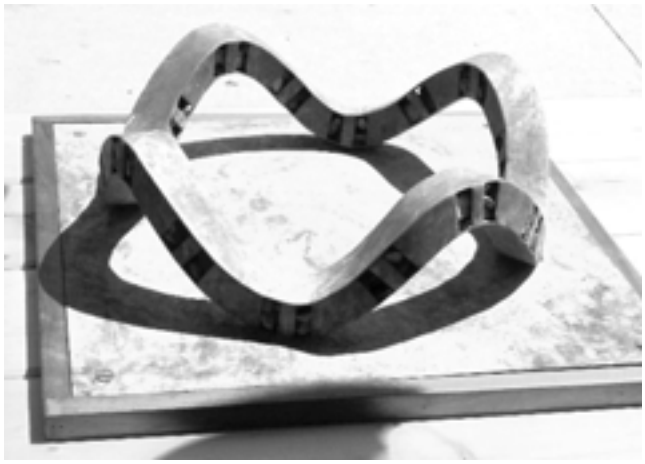
Peter Flanary is the chosen artist to create the sculpture for the newly renovated Chamberlin Hall. The maquette of his sculpture is shown here, and his vision for the final piece is a sculpture 12' in diameter and 4' high; each wave will be about 16" across. In July, Peter was deciding on the final resting ground for his piece, slated to take one year to complete.



Peter Flanary

Peter grew up in the Milwaukee area and has had a lifelong ambition to work as an artist. Most days, he is in his studio in Mineral Point, Wisconsin. He also is a part-time lecturer in the Art Department at UW-Madison. For Peter the creation process is not always direct; he tries to grasp the space in its complexity and wants to create something that can be remarked on by people. He starts working with a form — in the case of this project, a paper ring — and proceeds to bend and fold it, finally creating an undulating wave form which is conceived into the final sculpture, a bronze metal with granite stones, the entry for this art project. Granite, a glacial stone, comes from the earth from a variety of strata. He called this "poetics in a Whitman-esque way." He likes material and form and works to have his piece support and work in its environment, growing out of, rather than intruding into, the landscape. His choices of bronze and stone will outlast all of us, and it will serve as a joining of the physical sciences and art, an icon for the new Department of Physics home, Chamberlin Hall.

Maquette of sculpture



Perhaps this sculpture will be illuminated from the sun above during the day and dim lights from below during the night. His choice of materials is the choice often used for maritime objects; items that survive all, emitting an ageless quality and infinite longevity.

Some of Peter's other art projects include the Bay View Library, located at 2566 S. Kinnickinnic Ave. in Milwaukee, which opened in October 1993. The library, which is a 15,000 sq. ft. building on a lot of 25,632 sq. feet, makes extensive use of glass in its ultramodern building, creating an open, bright environment. It is contemporary with a dramatic, canted arched window at the south end; large bands of windows on the west and east walls; and a high, vaulted ceiling. Under the Milwaukee Arts Board's Percentage for Art program, artist Peter Flanary created three mosaic maps in the linoleum floor of the lobby, one representing Bay View at the time of settlement in 1846; another from 1900, when a steel mill on the lakefront spurred the community's growth; the third showing the area as it is today. Other art projects he has completed are a fireplace gathering area at UW-Oshkosh, a sculpture on the campus of University of Alabama and a piece at Milwaukee County's Grant Park in Milwaukee. He is working on another project to design an outdoor commons area at UW-River Falls while he completes the sculpture for Chamberlin.

SOME RECOLLECTIONS OF STERLING HALL (FROM 1946 ON)

We think of Sterling Hall in its present extent as the Physics Building. Actually in 1946, things were as follows. There was no east wing. There was no underground "courtyard" space. The "old new lab" had not yet been added. There was no Van Vleck Hall. At that time, Physics had only the basement and first two floors of old Sterling. The third and fourth floors were home to a few of the Social Science departments. We were a crowded and thriving department. Indeed one is reminded of the epigram that, "Any institution that is adequately housed is already dead." This department was very much alive.

Ray Herb's electrostatic accelerator occupied a large room in the northwest corner of the basement and was the major research facility in the department. Other centers of research activity were Julian Mack's grating spectrograph, Bill Beeman's x-ray laboratory, and J.G. Winans' molecular spectroscopy lab.

The present student shop was the machine shop. Across the hall was the curious battery room where, before the days of large and movable power supplies, d.c. power was sent to all the labs and lecture rooms by way of a switchboard, not unlike a very old-fashioned telephone exchange. The Physics-Math Library, presided over by Frances Christianson, was in what is now the second-floor demonstration storeroom. (The mathematicians walked from their home in North Hall for library work.)

The department office was run by one of the department's truly memorable characters, Molly McGuire. Molly was then assisted by Marilyn Balke, later to become the beloved den-mother to many of our graduate students from 1960 to 1990.

The east wing of Sterling Hall was built about 1957, along with the tandem van de Graaff vault. The tandem started operating in 1958. The early and mid 1960s were a time of rapid expansion on the campus. Van Vleck Hall and our underground courtyard space were completed (and the mathematicians acquired their own library). The new Social Science building allowed physics to expand into the third and fourth floors of old Sterling. The new Chemistry building, south of University Avenue, made space available in Chamberlin Hall, including a deluxe new physics library.

Sterling's only major tragedy occurred in August 1970: the protest bombing involving a fatality. Great damage was suffered by the lowest three floors of the south side of the east wing. The damage to the building was repaired as quickly as possible. The army math center moved from the upper floors of the east wing, giving us space there for our junior and senior instructional labs. The lecture room, with its excellent acoustics and clever design with the entrance at the front of the room so as to embarrass late comers, has been pretty much the same throughout, except for being electronified in the 1990s.

CHB

***The Wonders of Physics* next public presentations** are scheduled as follows:

February 13, 2005 1 and 4 pm
February 19, 2005 1 and 4 pm
February 20, 2005 1 and 4 pm

Free tickets are recommended and are available by calling (608) 262-2927 or by e-mail to wonders@physics.wisc.edu

These presentations will be held in 1300 Sterling Hall, 475 North Charter Street, Madison, WI.

ATTENTION: New Gift Fund #12694069

Friends of the L.R. Ingersoll Museum of Physics

Those who wish to contribute to this newly established fund can do so by directing their contribution to this fund, the L.R. Ingersoll Museum of Physics.

REMINISCENCES OF STERLING HALL

by Anne Herb

Sterling Hall goes back to around 1920. Until that time, physics was housed in the old red brick Science Hall on the NE corner of Bascom Hill. It was there that my father studied and earned his degree.

(We lived in a new neighborhood in Madison. I remember Dad going to work on his bicycle or taking the bus. Not everyone had an automobile at that time.)

It was also in the '20s and '30s that Professor E. M. Terry was working with radio. A university station later broadcast classroom programs to area schools. And for grown-ups, there were UW lectures and "Chapter a Day," the latter still heard twice daily on Wisconsin Public Radio.

Our family moved to Florida in 1930, but I came back to Madison as a freshman in 1939. I enrolled in a beginning Physics class for L&S students. There were two lectures, two 3-hour labs, and a "quiz" section each week. Laboratories and smaller classrooms were on the second floor, as was the Physics Library. Graduate students presided over the labs and quiz sections.

Physics was interesting, but I did not have the background in mathematics — calculus. I later took science classes as a nutrition major which did not, at that time, require so much math.

Sterling Hall was, and still is, home to the Astronomy Department. Chamberlin Hall, across the narrow drive on the south, was the Chemistry building, although other courses used the lecture halls. Pharmacy was for many years in a part of the Chamberlin building.

There may have been a few offices and classrooms on the ground floor of Sterling, although I remember best the machine shops and laboratory space for research. The first electrostatic accelerators were built and used there, although they served the country in Los Alamos during World War II.

On the main floor, to the left, is a large auditorium and lecture room. This was used extensively for demonstrations, guest speakers, and the Friday afternoon "colloquium" attended by department members and those from other fields interested in the speaker or topic.

At that time the Ingersoll museum was at the back, near the auditorium and considerably larger than the present one.

The nuclear physics section was in the south section of the building, parallel to the north side of the Chemistry building.

It was this side of the building that had to be rebuilt after the bomb damage in the 70's. There were offices and a small library and seminar room at the end of the hall. Astronomy occupied and occupies the upper floors of this section of the building.

Looking at the building now, offices and classrooms seem small and cluttered. The auditorium lecture hall is probably not much different than it was in 1940 when I was in school. (I think of the new engineering buildings, the Fluno Center, other new buildings where talks and lectures can be better illustrated — with much more space for students to see and hear.)

Chamberlin Hall — the former Chemistry building at University Avenue and Charter Street — is now the new home to much of the Physics Department and appears to be undergoing significant remodeling. Perhaps Sterling Hall will have its turn next.

Anne Herb

FACULTY NEWS & AWARDS 2004-05

After a vigorous 2003–04 faculty recruitment effort led by the New Staff Committee (Andrey Chubukov, Baha Balantekin, Susan Coppersmith, Dan McCammon and Dave Huber), along with Don Reeder, Chair, and Herb Wang, the Associate Dean of Physical Sciences, the Physics Department starts this fall with one new Associate Professor, **Marcus Müller**.

Professor **Marcus Müller** received his Ph.D. in theoretical physics in 1995 from the Johannes Gutenberg-University in Mainz, Germany working with Kurt Binder on structure and thermodynamics of polymer blends. After a TRACS visit at the EPCC Edinburgh, working with Mike Cates on ring polymers, he went as a Feodor Lynen fellow to the University of Washington, where he worked with Michael Schick on homopolymer/copolymer mixtures and, recently, fusion of model bilayer membranes. He returned to Mainz and obtained his Habilitation in theoretical physics in 1999. Before joining the Physics Department at the University of Wisconsin-Madison, Prof. Müller was Hochschuldozent at the University of Mainz, and a Heisenberg fellow of the German Science Foundation (DFG). He did research at the IFF, Jülich, Germany and the INIFTA and CNEA, Argentina. The APS awarded him the 2004 John H. Dillon Medal. His research interests focus on computational soft matter, in particular the phase behavior and interface properties in polymer blends, solutions and amphiphilic systems.

Marcus Müller

Quantitatively comparing computer simulations and numerical self-consistent field calculations, Prof. Müller investigates wetting and phase behavior in thin films, self-assembly of copolymers and binary brushes, the kinetics of phase separation, and coarse-grained models for membranes.

Faculty Promotion

Congratulations to **Mark Rzchowski**, who was promoted to Full Professor and to **Mark Eriksson**, **Yibin Pan** and **Mark Saffman**, who were promoted to Associate Professor with tenure, effective August 2004.

Faculty Retirements

For more than forty years, Professor **L. Wilmer Anderson** has applied his expertise in atomic physics, in particular, in the physics of optical pumping, to fundamental problems as well as to the development of innovative techniques in other fields. After receiving his undergraduate degree at Rice Institute (now University) and his Ph.D. at Harvard University, he joined the faculty at the University of Wisconsin in January 1960 as an Assistant Professor and has remained at the UW.

L. Wilmer Anderson

Early on Prof. Anderson measured the relaxation times of optically polarized alkali atoms in various buffer gases. In his studies of spin exchange collisions he developed the concept of "spin temperature," which has since been widely used in atomic physics. With the encouragement of Professor Willy Haeberli, he applied this knowledge and interest to the problem of developing a high intensity source of polarized ions for use in particle accelerators. In the 1970's he continued to work on these problems using laser techniques, in particular N2 and tunable dye lasers, which had become available for use in atomic spectroscopy. Combining his knowledge of optical pumping, charge exchange collisions, lasers, and polarized ion sources, Professor Anderson described in several papers his invention of an optically pumped polarized ion source (OPPIS). The OPPIS was a major success and is currently used at many particle accelerators, including the RHIC accelerator at Brookhaven National Laboratory. For this invention Professor Anderson was awarded the 1993 IEEE Particle Accelerator Conference Prize.

In recent years, Professor Anderson has worked with Professor James Lawler on chemical vapor deposition of diamond films. Together with Professor Thad Walker, he has used spin exchange optical pumping to produce hyper-polarized 3He and 129Xe. Among the various applications to physics and biology, these atoms are important in the magnetic resonance imaging (MRI) of the lungs. Professor Anderson also has collaborated for years with Professor Chun C. Lin. They have used electron beams in collision with target atoms in excited levels. The results of this innovative and seminal

work have been widely used in interpreting gas discharges and in other areas of physics.

In 1994, Professor Anderson became the Julian E. Mack Professor of Physics. Professor Anderson is an excellent teacher and a member of the Teaching Academy. He has taught most undergraduate physics courses and several graduate courses. He has written two books and originated a senior course on the physics of lasers and revitalized the course on atomic physics. Professor Anderson has compiled an outstanding record in research, teaching and service in the best tradition of the University of Wisconsin.

Professor **William Friedman** has well served the University and his research community of Nuclear Physics for the past thirty-four years. Graduating from the Engineering Physics Program at Cornell University in 1961, and receiving his Ph.D. in Nuclear Physics from MIT in 1966, he was awarded an NSF Postdoctoral fellowship to the Niels Bohr Institute in Copenhagen, and a position as instructor at Princeton University. In 1970 he came to Madison and was promoted to tenure in 1973.

William Friedman

Since his Ph.D. thesis, he has worked in the area of nuclear reaction theory, a broad field which has evolved over his career. This work includes important contributions in resonant reactions and the role of doorway state paths to the compound nucleus. He has studied statistical fluctuations and the role of doorway states on these fluctuations. He also has been concerned with direct nuclear reactions and has explored these with semi-classical techniques. He developed the concept of Barrier-Top-Resonances. He studied the fast fragmentation of nuclear projectiles and pointed out the importance of shadowing in determining the momentum distribution of the surviving fragment. Along with his students, he explored aspects of the pion-nucleus interactions and the phase transition to the quark-gluon plasma. For a number of years he has been involved in the study of the statistical fragmentation of nuclei and a possible "liquid-gas" phase transition. He developed the Expanding-Emitting-Source model, which has made major contributions toward understanding statistical fragmentation and nuclear temperatures. Quite recently he has been a leader in understanding "isoscaling" found in reaction yields. This signature is becoming a new tool of study for the field. A theorist, Professor Friedman maintains close contacts and frequently collaborates with experimental colleagues with whom he has collaborated on about one-hundred-fifty publications.

Professor Friedman has had an extremely active teaching career, teaching twenty different courses at the UW. These have ranged from courses for non-majors, through all levels of undergraduate courses, to the advanced and core courses of the graduate curriculum. He has served the department as chair of several important committees and served as Physics Department representative to the UW Faculty Senate.

Faculty Awards 2004-05

WARF/University Houses Named Professorships

On July 1, 2004, Professor **Baha Balantekin** became the Eugene P. Wigner Professor of Physics. Baha joined the UW faculty seventeen years ago after working at MIT and elsewhere. His research is at the intersection of nuclear physics, particle physics and astrophysics. Among his many interests are: the study of solar neutrinos, the role of neutrinos in the dynamics of supernovae, neutrino probes of gravitationally driven stellar oscillations, the properties of neutrinos using astrophysical observations, exactly-solvable problems in many-body quantum systems and the development of new mathematical techniques to address these physics questions. He is also a leader in the effort to build a U.S. Underground Science Laboratory.

Balantekin is a Fellow of the American Physical Society and currently serves as the Chair of the Division of Nuclear Physics. His awards include a Turkish Scientific Research Council Science Prize, a WARF Mid-Career Award, an Alexander von Humboldt Foundation Research Award (Germany), a Japan Society of Promotion of Science Senior Fellowship, a Presidential Young Investigator Award (NSF), and a Jefferson Award. This award recognizes his outstanding contributions to the University.

Baha Balantekin

Eugene P. Wigner (1902-95), born in Budapest, Hungary, received the 1963 Nobel Prize in Physics "for his contributions to the theory of the atomic nucleus and the elementary particles, particularly through the discovery and application of fundamental symmetry principles."

Vilas Associate Awards

Thanks to the generosity of the Vilas Trustees, the Vilas Associate program provides two summers of salary support to tenured faculty members who have academic appointments in order to further their research and scholarly activity. Each Vilas Associate also receives an annual grant of $10,000 in research support. Professor **Tao Han** was honored with a Vilas Associates Award for 2004-05.

Tao Han

Romnes Early-Career Awards

Seven UW faculty have received 2003 Romnes Fellowships from a program that helps younger faculty further establish their scholarly careers, and **Cary Forest** is one of these seven recipients. The Wisconsin Alumni Research Foundation supports the $50,000 fellowships. Recipients of the awards, which recognize exceptional faculty members who have attained tenure within the prior four years, are selected by a committee from the Graduate School. The awards are named for the late H.I. Romnes, former chair of the board of AT&T and former president of the WARF Board of Trustees.

Cary Forest

Cary Forest, Associate Professor, experimentally investigates topics ranging from transport of electrical current and energy in fusion plasmas, to understanding how astrophysical and geophysical magnetic fields are generated from flows of liquid metals (or plasmas) in planets and stars.

Election to Fellowship in the American Physical Society

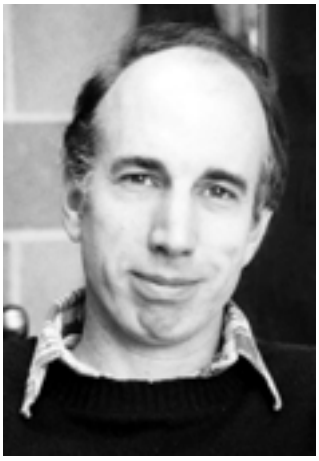
Professor **Tao Han** was elected to Fellowship in the American Physical Society at the November 2003 meeting, upon the recommendation of the Division of Particles and Fields. This honor is limited to no more than one half of one percent of the membership. The citation which appeared on Tao's Fellowship Certificate reads, "For contributions to the physics of electroweak symmetry breaking, Higgs bosons, supersymmetry and to collider phenomenology."

Andrey Chubukov

Professor **Andrey Chubukov** was also elected, with this citation, "For distinguished contributions to condensed matter theory, notably the theory of high temperature superconductivity and the relation between spin fluctuations and the effective interaction for electron pairing." He was nominated by DCMP (Condensed Matter) Division.

Sabbaticals Awarded

Professors **Baha Balantekin**, **Tao Han** and **Dan McCammon** were each awarded a sabbatical for the academic year 2004–05, and Professor **Franz Himpsel** was awarded a sabbatical for the Fall semester 2004–05 to pursue their research.



Dan McCammon

THE MST PLASMA CENTER

by Stewart Prager

Plasma physics spans a huge range of phenomena, from laboratory plasmas to the solar corona to the tenuous interstellar and intergalactic gas. Despite enormous differences in physical scales, similarity in plasma behavior of laboratory and astrophysical plasmas is striking. Similar plasma physics puzzles are often investigated separately by laboratory physicists and astrophysicists. For example, a laboratory plasma physicist observes spontaneous generation of toroidal magnetic field in experiment, while an astrophysicist observes cyclical variation in stellar magnetic fields — both effects known as dynamos. A laboratory physicist observes that ions are unexpectedly hotter than electrons, as is also true in the solar wind — both examples of spontaneous heating of ions, not yet understood.

To solve these and other problems, the National Science Foundation, in partnership with the Department of Energy, has established a Physics Frontier Center in plasma physics — the Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO). The multi-institutional center is headquartered at the University of Wisconsin. The key feature of CMSO is that it brings together laboratory plasma physicists, particularly fusion scientists, with astrophysicists to attack these common problems. It includes experiments, theory, and computation.

Magnetic self-organization refers to the tendency of a plasma to rearrange its large-scale structure (of quantities such as magnetic field and plasma flow) through smaller-scale fluctuations in the magnetic field. The fluctuations arise from excess free energy that drive the plasma toward a lower energy state. CMSO will investigate six topics within the theme of magnetic self-organization. The topics, and some sample questions, are…

Dynamo effects: What determines the spontaneous generation of magnetic fields throughout the universe? Magnetohydrodynamic (MHD) theory predicts the initial, exponential growth of a seed magnetic field. There are two major questions we seek to answer: What determines the nonlinear saturation of the dynamo? Are there new dynamo mechanisms beyond that of the standard MHD models?

Magnetic reconnection: What determines the spatial scales and rates of reconnection — the change in magnetic topology via field line tearing and reconnection — in coronae of stars, in stellar accretion disks, and during relaxation of laboratory plasmas?

Plasma MST Group

Magnetic helicity conservation and transport: Is magnetic helicity, a topological measure of magnetic field knottedness, a conserved quantity during self-organization, and is it a key constraint for dynamos, and for magnetic relaxation in the solar corona and the laboratory?

Angular momentum transport: What determines momentum transport essential for the disk accretion of matter onto compact objects such as black holes and for the sudden rotation changes in laboratory plasmas?

Ion heating: Why are ions in the solar wind, laboratory plasmas, and possibly accretion disks, hotter than the electrons? (6) Magnetic chaos and transport: How are plasma energy and particles transported along magnetic field lines that wander chaotically, as occurs for cosmic rays in the heliosphere and galaxy, laboratory plasmas, and thermally inhomogeneous interstellar and intergalactic plasmas?

CMSO involves five institutions, in addition to the University of Wisconsin: the University of Chicago, Princeton University, Science Applications International Corporation, Swarthmore College, and the Lawrence Livermore National Laboratory. The center, authorized initially for five years, began in September, 2003.

The MST plasma physics experiment in the UW Physics Department is central to the activity. MST is separately funded by DOE for basic plasma physics and fusion energy research. For many years, MST researchers have appreciated the potential connection of MST results to astrophysics. But, the connections were not exploited. The new center will forge that link. UW CMSO activity also includes theorists and computational scientists in the departments of Astronomy, Engineering Physics, and Physics.

The center includes four experiments: MST and experiments at Princeton, Livermore Lab, and Swarthmore College. Taken together, and through joint experiments, they span a range of plasma conditions and configurations. Theory and computation will then relate experimental studies to astrophysical situations. The center will employ a variety of codes, some based on the equations of magnetohydrodynamics, some beyond, to study self-organization.

CMSO is beginning an educational outreach activity. It includes the introduction of new plasma physics material into the popular Wonders of Physics lecture/demonstration program, as well as new initiatives.

For further information, see www.cmso.info

GRADUATE PROGRAM REPORT

by Barb Schutz

This was a year of some changes from the recent numbers in our graduate program applicant profiles. The Admissions and Fellowships Committee (under the chairmanship of Cary Forest) is pleased to report that a total of 76 offers were made (66 first round, 10 second round). See Table 1 for Fall 2004 admission statistics.

Table 1: Fall 2004 Applications and Admissions

	Apps	Offers	Accepts
Total	344	76	25
Domestic	179	62	22
International	165	14	3
Male	267	59	20
Female	77	17	5

Although the total number of applications was down approximately 15% from last year, domestic applications were up about 35%. The current budget constraints limited the number of offers we were allowed to make. Still, the acceptance rate was good with 25 new students for the Fall of 2004, including one Advanced Opportunity Fellowship.

The distribution of domestic to international applications for this year's Physics graduate program was atypical because international applications typically outnumber domestics by about one-third. International applications for Fall 2004 dropped across the board to the tune of 40% for China and 30% for all other foreign countries. One of the reasons for this could be that visa and travel restrictions are becoming more stringent for many international students, and requests for letters of support from the department are becoming more common.

Recruiting actions instituted a few years ago continue to be successful — namely, two group visit events in March, greater involvement of current graduate students, an increased financial supplement to all TA offers with a marked boost to our top 8 applicants, and several summer RA offers to prospective students. Our current group of first-year graduate students deserves special recognition for the effort and enthusiasm they demonstrated in assisting with our group visit events this year. They are a cohesive group who have proven to be terrific ambassadors for our graduate program. Prospective students unable to participate in the group events were given the option of an individual visit to campus.

We invite you, as alumni, to encourage prospective graduate students to consider pursuing their graduate studies at the UW-Madison.

Awards Honor Graduate Students

Del Marshall won the ***Joseph Dillinger Award for Teaching Excellence*** in May, 2004. Del has served as head TA for Physics 103 and 104 for many semesters and has been instrumental in rewriting the 103-104 lab manuals and putting the courses in an online mode. Congratulations, Del!

Kelly Pellerin and **James Braun** won the ***Emanuel R. Piore Award***, which is presented annually to recognize excellence on the Qualifying Examination.

Kelly Pellerin

Kelly Pellerin wrote that she graduated from the Physics department at Carnegie Mellon University in Pittsburgh, PA, having worked with Sara Majetich doing research with bare and carbon-coated magnetic nanoparticles. During her time there, she spent a summer working at Seagate Technologies in Minneapolis, MN, studying giant magneto-resistance in spin-valves used in computer hard drives.

After that, she worked for several years at NEC Research Institute in Princeton, NJ doing research in surface plasmon optics with Tineke Thio. She has been interviewed in *Science* for her work on photonic crystals, and her publications include papers in *Physical Review Letters*, *Optics Letters*, *Nanotechnology*, *Journal of Applied Physics*, *IEEE Transactions on Magnetics*, and an article featured on the cover of *Optics and Photonics News*.

She is currently a graduate student in the UW Physics Department working with Franz Himpsel making one dimensional chains of magnetic nanoparticles on Si surfaces.

The ***Jansky Award*** was given to **Marta Sewilo** of Astronomy. This award goes to an outstanding graduate student pursuing an advanced degree with interest in astrophysics and astronomy.

Two women won the ***Hirschfelder Award***, to pursue travel or a conference in support of their area of research: **Karina Flavia Louriero** and **Meghan Curry O'Connell**.

Hillary Cummings and **Meghan Curry O'Connell** won the ***Advanced Opportunity Fellowship*** for 2003-04, and **Nicolas Nelson** was a ***WARF Sponsored Research Fellow*** for 2003-04.

Meghan Curry O'Connell

Nicolas Allen Nelson wrote that "growing up in Lake Mills, a small town near Madison, I had always felt a certain desire to attend UW. I chose, however, to pursue my Bachelor's degree at Marquette University in order to escape most of my high school classmates. At Marquette I had the opportunity to study physics in an intimate setting, not having a class size larger than five and I was able to perform theoretical research on Liquid State Theory one-on-one with a faculty member I also had the privilege of teaching lab courses in introductory physics, which was very influential on my current career path. Because I loved my teaching so much, I decided to pursue graduate school and a future college professor position."

"I chose UW for graduate study for both its prestigious physics program and its location. I have recently become engaged to Jenny Gillespie who is completing her education at Marquette and will continue on with a career in Construction Management in the Milwaukee/Madison area. When I was accepted into UW, I felt extremely fortunate. After a visit last summer, I decided to jump into superconductivity. My first year has, thus far, been very interesting. I have learned much about the subject and equipment used in the department. Upon completion of my PhD, I hope to get right into teaching at the college level."

Nicolas Nelson

NEW PHYSICS Ph.D.'s

August 2003

Christian Ast
"The electronic structure of Bi(III)," (Huber/Hochst) Postdoc, Max-Planck Inst. fur Festkorperforschung, Germany

Jason Crain

"Electronic Structure of Two- and One-Dimensional States on Silicon," (Himpsel), Postdoctoral Fellow, NIST, Electron Physics Group. Gaithursburg, Maryland

Marcin Jakubowski

"Measurement of the Turbulence Flow Field in the DIII-D Tokamak," (Prager/Fonck), Self-Employed Environmental Consultant

Robert McElrath

"The Phenomenology of Electroweak Symmetry Breaking Scenarios," (Han), Postdoctoral Fellow, UC-Davis Physics Dept, Davis, California

Michael Schneider

"Time-Resolved Optical Studies of Single and Double Layer Cuprates," (Onellion), Postdoc, US Dept of Commerce, NIST, Boulder Colorado

Todd Zimmerman

"Use of Atom Traps to Measure Ion-Atom Collision Cross Sections," (Lin) Instructor, MATC, Madison WI

December 2003

Robert Atkins

"The Development of Atmospheric Cherenkov Detectors at Milagro to Study Cosmic Rays," (Dingus), Postdoc, Dept of Physics, Univ of Utah, Salt Lake City, Utah

Derek Baver

"Nonlinear Instability Due to Phase-Locked Nanorthogona Eigenmodes in Electrostatic Turbulence," (Terry)

Jodi Cooley-Sekula

"Searching for High Energy Neutrinos with the AMANDA II Detector," (Karle), Postdoctoral Research Assistant, MIT Lincoln Labs, Cambridge Massachusetts

Fatima Ebrahimi

"Nonlinear Magnetohydrodynamics of AC Helicity Injection," (Prager), Postdoctoral Research Associate, UW-Madison Physics Dept, Madison, Wisconsin

Slade Klawikowski

"A search for the cosmic microwave background polarization and foreground contaminants," (Timbie), Self-employed, Winthrop, Massachusetts

Raymond Newell

"Cold and Dense Atom Clouds in a Holographic Atom Trap," (Walker), Postdoc, Los Alamos National Lab, Los Alamos, New Mexico

John Peck

"Linear and Nonlinear Impedance Spectroscopy of Electrode/ Solution Interfaces," (Eriksson/van der Weide), Stanford Research Systems, Stanford, California

May 2004

Anthony Gerig

"Ultrasonic scatterer size estimation and imaging with a clinical scanner," (Reeder/Zagzebski), Postdoc, Penn State Applied Research Lab, State College, Pennsylvania

Amihan Huesmann

"The stratospheric QBO, the NCEP reanalysis, and RWB in the Middleworld," (Cox/Hitchman), Postdoc, UW-Madison, Atmospheric & Oceanic Sciences Department, Madison, Wisconsin

Sabine Lammers

"A Study of Parton Dynamics at Low x with ZEUS at HERA," (Smith), Postdoc, Germany

Paul Rugheimer

"Substrate engineering and strain effects on the growth of Ge on Si." (Lagally) Postdoc, UW-Madison, Materials Science & Engineering, Madison, Wisconsin

Stephen Sekula

"A Search for $B^+ \to \tau^+ \nu_\tau$ Recoiling Against $B^- \to D^0 \ell^- \bar{\nu}_\ell X$," (Pan), Postdoc, MIT, Cambridge, Massachusetts

MASTER'S DEGREE RECIPIENTS

August 2003

Jaques Bluett
Chun Ki Kenny Cheng

December 2003

Ana Laura Garcia-Perciante
Andriana Reyes-Newell
Graham Smith
Krupakar Subramanian
Lei Wang

May 2004

Yoshinori Aiura
Eric Brownson
Matthew Daniels
Ada Rubin

BARB SCHUTZ — WINNER CLASSIFIED MID-CAREER AWARD

New Classified Staff Panel Honors Six L&S Employees, Including Barb Schutz from Physics… from Wisconsin Week 3/24/2004.

MADISON - As part of an effort to give classified staff members a greater voice and more recognition in the College of Letters and Science at the University of Wisconsin-Madison, six college employees are the inaugural winners of Classified Staff Excellence Awards.

"As part of our initiative on improving campus climate, we have formed a Classified Staff Issues Committee that deals with staff issues and promotes recognition for outstanding work," said Phillip R. Certain, Dean of the College.

The seven-member committee, created in 2003, provides input regarding college policies that affect classified staff, offers opportunities to develop new initiatives for professional growth and advises the dean on various policy issues.

Barb Schutz

One of the committee's early initiatives was to identify workers who have made outstanding contributions, and recognize them with cash awards.

Winners of the ***Mid-Career Award*** for nine or more years of service to the colleges were Jean Hennessey, program assistant in Slavic Languages, and **Barb Schutz**, a student status examiner in the Department of Physics.

The six awardees were honored at a May 24 reception from 3:30-5:30 p.m. in the Skyview Room of the Fluno Center, 601 University Ave.

The college has 383 permanent classified staff members and 262 have more than 10 years of service to the state, according to Diana Allaby, the college's human resources manager.

Certain says the committee is not a collective bargaining mechanism, but a way to assure that classified staff members can be heard on policy issues that pertain to them.

"Many classified staff members feel invisible on campus, even if they are playing crucial roles," Certain says. "The committee has provided a helpful and enlightening way to talk about issues that have an effect on classified staff."

Committee member Susan Barthel, assistant to the associate dean of student academic affairs in the College of Letters and Science, said the panel's work can help respond to staff ideas.

"I see it as a way of implementing things when people have concerns or suggestions," Barthel says. "That's the next step in the process — to make some positive changes."

Congratulations to Barb for her efforts and hard work in the Physics Department!

CONGRATULATIONS TO JESSICA MC CHESNEY…

Who completed her Ph.D. in Physics in four years…
Yes, it can be done!

Jessica McChesney finished her Ph.D. in a mere four years. As one might guess, she is a very energetic graduate student and has accumulated a substantial portfolio of research projects and publications already. She is co-author on about a dozen publications about various topics in nanotechnology, including a Phys. Rev. Letter.

It helped that she had research experience as an undergraduate, both at Sandia Livermore (working on semiconductors) and at West Virginia University (working on magnetism). At the UW-Madison her research started with the fabrication of nanowires by self-assembly on a silicon wafer, which will be a necessary skill for producing future nano-electronic devices. After publishing a paper on the results in the journal Nanotechnology she moved on to make her nanowires even smaller. Eventually they became so small that each wire consisted of a single atom chain. These are the ultimate nanowires, right at the atomic limit.

She played a major role in getting an atomic scale memory to work, where a bit is stored by the presence or absence of a single silicon atom. This paper has received substantial public response. It was featured on *BBC Online News* and in the German magazine *Der Spiegel*. An image of the memory that she submitted is now on the nano-science and -technology poster of the American Vacuum Society. Jessica presented a poster of her work to Representative Vernon Ehlers, one of the few physicists in Congress.

This memory structure is formed by a self-assembly process which takes advantage of an intricate interplay between atoms and electrons at a silicon surface. Finding out how this works has been the core of Jessica's thesis. She started out exploring the structure of the atoms and manipulating them by scanning tunneling spectroscopy. Then she went on to look at the electrons using the Synchrotron Radiation Center (SRC) just south of Madison.

AWARDS HONOR UNDERGRADUATE STUDENTS

Undergraduate/Faculty Hilldale Awards

Congratulations to our ***Hilldale Undergraduate Research*** winners, **Craig Jacobson** and **Samuel Stambler**, who will work with Professor Cary Forest; and **Steven Sendelbach**, who will work with Professor Marshall Onellion.

L.R. Ingersoll Awards

L.R. Ingersoll Awards for distinguished achievement in undergraduate physics for spring and fall were awarded on May 7, 2004 at the Physics Banquet & Awards Ceremony at the Fluno Center. Awardees included:

Spring 2002-03
Mary E. Anderson (103-104)
Jennifer J. Barr (201-202)
Rebecca Shapiro (207-208)
Benjamin Potratz (248)

Fall 2003-04
Kyle L. Atkinson (103-104)
Julie C. Ripp (103-104)
Mingzi Zhang (201-202)
Emily Stevens (207-208)
Ben Spike (247)
Grant Kudert (247)

Albert Augustus Radtke Scholarship

The 2004 ***Albert Augustus Radtke Scholarship*** for distinguished achievement in the study of undergraduate physics was awarded to several physics students, including **Paul Larsen, Andrew Huening**, **Lawrence Klein** and **Aaron Struck.**

Paul Larsen

Paul Larsen wrote, "I am a junior majoring in Electrical Engineering, Physics, and Math. My course work has focused on electromagnetics and its applications, in addition to a breadth of EE and physics courses. Other various courses with related interest include signals, circuits, analysis and quantum mechanics."

"I am currently doing research in the Electrical Engineering Department with regenerative Traveling Wave Tube Amplifiers induced to operate in a chaotic mode. This summer I will be working on an internship with the Electron Devices Division of L-3 Communications in San Carlos, CA. My future plans are to attend graduate school in the fall of 2005, but my course of study is not yet decided."

Aaron Struck told us of his future plans, "After four years of studying physics at UW-Madison, this summer I am going to travel to Ecuador for a month-and-a-half. Hopefully it will be a pleasant break from quantitative reasoning. In Ecuador, I will be working in a rural medical clinic. Also, I will be traveling and taking classes in Spanish and traditional culture. Although this may seem strange for a physics student to do, it is because I am now a medical student."

Aaron Struck

"I am going to attend medical school back in Madison this fall. Nothing against Sterling, but I am looking forward to the change of pace and the new medical school building. I am not sure exactly what field of medicine I am interested in; however, I am intrigued by the new frontiers that physics is pushing medical science into. In the undergraduate medical physics class that I took here at UW, I got to see firsthand the linear accelerator and PET scanners at the Waisman Center. These new tools for looking into the human mind in addition to my internship with a prominent neurosurgeon, have helped direct my focus toward neuroscience. However, right now I am keeping an open mind as I search for my niche in the scientific community."

Fay Ajzenberg-Selove Award

The 2004 ***Fay Ajzenberg-Selove Award*** for outstanding undergraduate women majoring in Physics, Astrophysics or Astronomy had two winners this year: **Jana Grcevich (Astronomy)** and **Julie Scanlan (Physics).**

And from **Jana Grcevich**, "I began to be interested in physics and astronomy in seventh grade, when I read A Brief History of Time by Stephen Hawking. I was deeply interested by a view of the world that I'd never experienced before. I read many more popular books on the subject, but I never felt like they satiated my curiosity."

"During my first year at UW-Madison, I took the Modern Introduction to Physics introductory sequence (247-248) where I solidified my interest in physics. That year I also took an astronomy course taught by Dr. Eric Wilcots. The following two summers I worked with Dr. Wilcots studying Seyfert galaxies and stellar feedback mechanisms. I also had the incredible opportunity to help on an observing run at the WIYN 3.5m telescope at Kitt Peak near Tucson, Arizona. Next summer I will be participating in a National Radio Astronomy Observatory REU in Socorro, New Mexico. With guidance from Dr. Yancy Shirley, I will be searching for pre-proto stellar cores in molecular clouds."

"This is my third year at UW-Madison; I will graduate next year with degrees in astronomy-physics, physics, and mathematics. The experience has been overwhelmingly positive, and I have been lucky enough to have wonderful professors and friends. I plan to attend graduate school in either astronomy or physics."

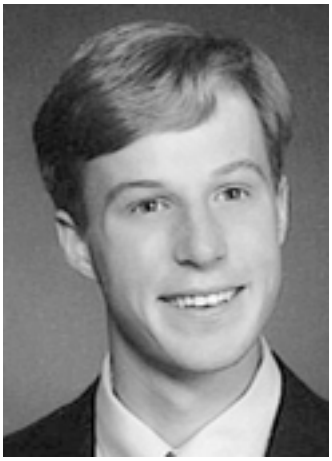
Julie Scanlan writes, "I have been attending UW-Madison for three years, and plan on graduating in spring of 2005. My major is physics, but I am also getting a certificate in environmental studies. I love both the city of Madison and the UW, which is why my first choice for graduate school is to stay here. Unable to pick a field of physics that holds particular interest for me, within the past year I have found myself more and more drawn to the earth sciences for graduate study. I intend to use this summer to consider what field of study I want to pursue before I apply to graduate schools next fall."

Julie Scanlan

"When I finish with school, I would prefer to work in research at either a university or for the government. While I admire areas of science that focus primarily on advancing humanity's knowledge, my own desire is to aid in research that seeks to identify and solve serious problems within our world. I am particularly concerned about the effects that humans are having on the environment, and would like to focus my career on studying one of the major problems that the planet will be facing in the coming century."

Liebenberg Family Undergraduate Summer Research Fellowship

Our thanks go to the family of Maude Liebenberg and her son, **Don.** Because of their generosity, the ***Undergraduate Summer Research Fellowship*** was available for **Joseph Wildenberg** at the May awards banquet. This award provides funding to encourage undergraduates to become involved in summer research programs.



Joseph Wildenberg

Here is the story of **Joseph Connell Wildenberg.** "As a wide-eyed middle-school student, I didn't know what to expect when I came to Madison for a Wisconsin football game with my parents. A graduate of UW-Madison, my father took me on a tour of the campus, specifically Chamberlin Hall. When I reached the basement and saw the Madison Symmetric Torus, with all its protruding wires and intricate machinery, I made my decision: I will attend this university."

"Years later, I enrolled as a freshman with the intent of majoring in chemistry. It took only a few semesters for me to realize that it wasn't chemistry that held my interest. Physics, with its ability to describe just about every physical phenomenon, was what I wanted to study. I have a wide range of interests and my declared majors are physics, mathematics, computer science, and molecular biology. I hope to enroll in an M.D./Ph.D. program which will allow me to receive a concurrent M.D. and Ph.D. in physics. I would like to use this knowledge to research the human nervous system with an emphasis on the supposed quantum mechanical nature of the brain."

Dr. Maritza Irene Stapanian Crabtree Undergraduate Award

This is the second year of this award, which stems from a bequest by William Crabtree on behalf of the late Dr. Maritza Irene Stapanian Crabtree to the University of Wisconsin to support tuition and fees based equally on merit and need for undergraduate students in Physics. This year's winners are **Emily Harrison** and **Aaron Madlon-Kay.**

Aaron Madlon-Kay writes, "I fell in love with physics during my advanced physics class in high school. Although I did not originally want to take it, the rewards have been well worth

the challenge. My high school teacher instilled in me a deep love for physics, even teaching us modern physics, and a desire to learn more about it. My physics professors here have been wonderful in keeping my love of physics alive, and after having an exciting first semester in the new physics 247 class, I became a declared physics major. Next year I will likely declare math and astronomy majors as well."

"I have recently completed my second year of study here at Madison, and I currently work with Mark Eriksson and the quantum computing team. After my graduation, probably in May of 2005, I plan on entering a Ph.D. program involving either quantum physics or particle physics. I would love to do research with a particle accelerator one day, and I also hope to teach at a university."

"In my 23 years, I have spent a lot of time hanging around Madison. I moved here when I was less than a year old, learned to walk on the bridge between Sterling and Van Vleck, attended James Madison Memorial High School, and when it came time to choose a college, I had no desire to leave! I did take a year to live in Aix-en-Provence, France, where I studied anything but Astrophysics, instead soaking up the language, literature, history, and life in general and traveling about Europe a large amount. Upon returning to Madison, I finished up my undergraduate majors in perhaps typical harried fashion, taking the GREs and writing a senior thesis on the stellar velocity dispersion in Magellanic Spirals with Professor Wilcots."

"In the coming year I will begin my graduate work in Astronomy at the University of Arizona Steward Observatory. With Tucson surrounded in all four directions by craggy, cactus-laden mountains topped with telescopes, I look forward to many observational opportunities. My first-year project will be on galaxy morphology and evolution, a topic that has intrigued me for some time. I have had a wonderful experience at UW-Madison. Thanks to everyone who has been a part of it, and I am excited to try out a new life in a new locale!"

Bernice Durand Undergraduate Research Scholarship

Our award that goes to undergraduate women or minorities majoring in or planning to major in Physics or Astronomy is made possible through the generosity of Associate Vice Chancellor and Physics Professor **Bernice Durand**, who established this scholarship to encourage young women and minorities to do research and continue their career in science.

This year's winner is **Allison G. Nobel**, who will work with Professor Peter Timbie doing research this fall.

Allison writes, "My first exposure to physics and math stemmed primarily from my dad, who was always answering my questions about the universe and entertaining me with mathematical word problems. After completing a high school physics course, I was almost certain that I would continue with physics. However, upon entering Madison I became a little distracted with the myriad of courses available and took everything from Spanish, Italian, and art history to history of science, psychology, chemistry, math, and finally physics. Although I still love the arts and languages, I now know that physics is what I want to pursue."

"I am very honored to have been chosen for the ***Bernice Durand Undergraduate Research Scholarship,*** and next fall I look forward to working with Professor Peter Timbie and his research with the Millimeter-wave Bolometric Interferometer. After graduating with majors in physics and astronomy-physics, I plan on attending graduate school and perhaps even living in Europe for a year. After that, who knows where I'll end up!"

Allison Nobel

UNIVERSITY PHYSICAL SOCIETY-UPS

The Physics Club of University of Wisconsin-Madison, also known as the University Physical Society, can be found at: www.sit.wisc.edu/~ups/index.html.
Check it out!

They feature information on:

- **Jobs**: Job postings in the UW Physics Department
- **Events**: Upcoming UPS Events
- **Officers**: Your UPS Officers
- **Research**: How to find research opportunities
- **About**: What is the University Physical Society?
- **Tutoring**: We offer volunteer tutoring
- **Humor**: Bad physics humor
- **Photos**: Physics Club memories

They also provide links to The American Physical Society and the Society of Physics Students.

The officers for 2004–05 academic year are:

Shane McMahon (President)
Seth Bruch (Vice President)
Vipul Chaudhary (Treasurer)
A.J. Carver (Education & Outreach Coordinator)
Kristin Lewis (Communications Director)
Nick Proite (Secretary)

New Chamberlin views

UPS officers from left to right:
Seth Bruch, Nick Proite, Shane McMahon, Vipul Chaudhary, Kristin Lewis and A.J. Carver.

UW GRAD IS STAR ON HER RETURN TO CAMPUS

by Ron Seely, Wisconsin State Journal

It's a long jaunt from Lancaster to the universe's most remote galaxies!

But **Anne Kinney**, one of Lancaster's own, now spends her days exploring the reaches of space for NASA. The UW-Madison Physics alum is director of the agency's Astronomy and Physics division.

Kinney was back on campus Friday to talk about NASA's search for Earth-like planets and it's study of black holes-subjects that truly seem out of this world for somebody who grew up surrounded by farm fields and dairy cows in southwestern Wisconsin.

Kinney spoke in the same Sterling Hall auditorium where she took her first college physics class. After graduating in 1975, Kinney went on to study at the Niels Bohr Institute in Denmark and got her doctorate in physics from New York University in 1984.

Kinney, 54, was presented a Distinguished Alumni Award at the Physics Department's annual banquet Friday night.

During her career, Kinney said, she has been fortunate to work with three of history's greatest observatories. Those include the Hubble Space Telescope, which has provided remarkable images of remote galaxies and distant star birthing regions, as well as two lesser known but equally important telescopes: the Spitzer Space Telescope, which takes infrared images, and the Chandra X-ray Observatory, which detects X-ray sources that are billions of light years away.

Kinney is especially fond of Hubble. She worked as an instrument scientist at the Space Telescope Science Institute when the telescope was being built. She remembers working with the four-story tall telescope towering above her, shining in it's Mylar sheath.

Such instruments have revolutionized astronomy and made possible findings on the size and fate of the universe and the invisible, violent workings of black holes.

"We really have an embarrassment of riches in astronomy right now," Kinney said.

Of special significance, Kinney said, has been recent work done by the agency on the discovery of Earth-like planets. It's a booming field in astronomy, she added. Ten years ago, the only known planets were in our solar system. Today, we know of more than 100 large planets surrounding other stars. Because the planets are lost in the bright glare of their suns, Kinney said, astronomers have discovered them by studying the movement of the suns as their planets' gravitational pull tugs them back and forth. Now, Kinney said, astronomers are busy searching for smaller planets that might harbor life. Kinney is overseeing the construction and launch of a series of telescopes that will fly and work in tandem to give astronomers a powerful enough instrument to view a planet.

Such science, Kinney predicted, will continue to be well funded even with President Bush's recent proposal for manned exploration of Mars. A better understanding of space is essential to such exploration, Kinney said. She added that Hubble, which was once thought to be a victim of the Bush proposal, may now be saved if a robotic service mission can be designed.

Why should we care about space and other planets?

Kinney pointed out that astronomical discoveries often change how we view ourselves and our world. When Galileo took what had been an instrument of war - the telescope - and turned it toward the heavens, he saw the moons of Jupiter. They seemed much like our own moon, and the discovery changed how we humans thought of ourselves and our world.

So it would be, Kinney said, if we were to find another planet like our own.

"There are profound implications," Kinney said. "In the end it will give us the context to really understand who we are."

Anne Kinney

FORMER GRADUATES' AWARDS/ ALUMNI INFORMATION

Peter Maas (Ph.D.,1993) is employed by TD Securities in Chicago, Illinois, where he specializes in mathematical methods for the pricing of derivative contracts. He completed his doctorate under Professor Lee Pondrom. Nice to hear from you, Peter.

This year the Physics Department chose to honor two more alumni as Distinguished Alumni Fellows: **Anne V. Kinney** and **David Cline.**

Anne V. Kinney's (B.A., 1975, UW-Madison; Ph.D., 1984, New York University) broad experience in astronomy, from promoting astronomy to the public to working as a Hubble Space Telescope instrument scientist, serves as the background for her job as Director of the Astronomy and Physics Division of NASA. Her main challenges are to get the James Webb Space Telescope and the Space Interferometry Mission launched and to interact with the astronomical community to keep informed of the latest science. She earned a Bachelor of Arts degree with honors from the University of Wisconsin in 1975 and a doctorate in astrophysics from New York University in 1984.

"Astronomy and Physics have spectacular new projects, and one of my duties is to keep them on track and on budget so that they actually fly," Kinney says. "By working closely with astronomers, I will seek out cutting-edge technologies and advocate new missions that will help deepen our understanding of the universe."

Another special role for Kinney is continuing her public outreach efforts. "I want to cultivate an active relationship with the American public to bring science to people who pay for it," she explains. Working at the Space Telescope Science Institute in Baltimore, Md. for 14 years has given her the skills to efficiently perform her science program director duties.

As an instrument scientist for the Hubble telescope's Faint Object Spectrograph (FOS), Kinney learned the complexities of a spacecraft. She also saw the Hubble telescope before it was launched.

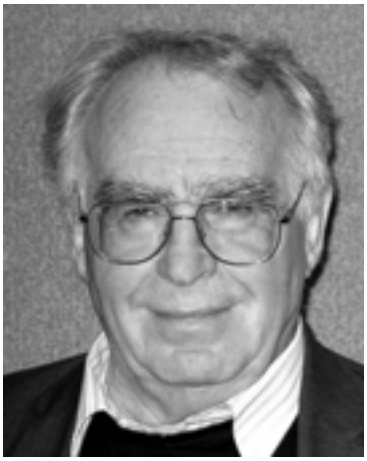
"I was testing the FOS camera at Lockheed Martin," Kinney recalls. "The four-story-tall telescope loomed above me, all covered in its shiny Mylar. Because of that experience, I have a real affection for the telescope and an appreciation for other spacecraft in the Astronomy and Physics program."

Kinney also worked in the institute's Office of Public Outreach, leading the education department and offering her expertise as a guest commentator on NASA's Space Science Updates (SSUs). She also is a co-investigator for the Hubble Heritage Project.

Among the seventeen SSUs in which Kinney participated, her most memorable were the programs on debris striking the inner ring of Supernova 1987A and the dynamic weather on Mars. After the Mars SSU, Kinney reported on Mars's weather patterns for a Washington, D.C. television station.

Kinney has written 75 scientific papers, including one on an atlas of galaxy spectra taken in ultraviolet light. The paper was produced at a time when astronomers didn't have an overall picture of how galaxies looked in ultraviolet light. Kinney's data are important to understand the populations of stars in the galaxies and eventually to comprehend the relationship between galaxies of different types.

Kinney serves on the editorial board of *Astronomy Magazine* and is an American Astronomical Society council member.



Dave Cline

David Cline's (Ph.D., 1965) major focus is on Astroparticle Physics — connecting the world of elementary particles with Cosmology and Astrophysics. One topic of interest is the possible existence of a mass for the cosmologically interesting mu or tau neutrinos and methods to detect this mass using terrestrial solar or supernova neutrino sources. He participates in a collaboration to develop a supernova burst observatory in New Mexico for this purpose. Another study is the solar neutrino puzzle and nucleon decay using the ICARUS detector at the Gran Sasso Laboratory in Italy. Dr. Cline recently started to study the unique detection of Primordial Black Holes. These objects would have been born in the very early universe and would provide the ultimate merger of particle physics and strong gravity. These activities are supported by the DOE. Dr. Cline is also studying various types of gamma-ray telescopes for future gamma-ray astronomy programs.

This year the Physics Department chose to honor two more alumni as Distinguished Faculty Fellows: **Marvin E. Ebel** and **Keith Symon**.

Professor **Marvin E. Ebel** joined the UW-Madison Physics faculty in 1957. Professor Ebel provided 37 years of meritorious service to the University of Wisconsin-Madison. His contributions to research and teaching have greatly enhanced UW-Madison's reputation as an institution of higher learning. His service to the University as Chairman of the Physics Department was outstanding.

Marv Ebel

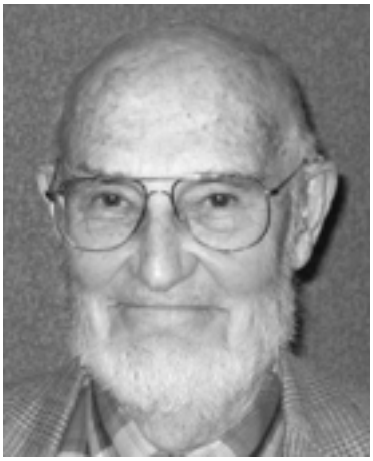
Professor Ebel supervised Ph.D. research and contributed in a remarkable variety of topics in theoretical physics. The subjects ranged from high energy physics, nuclear reactions and quantum field theory to the channeling of charged particles in solids.

He directed eleven Ph.D. theses, and the majority of his students themselves followed academic careers. He was an extremely clear lecturer, and his teaching in the Physics Department always was highly regarded.

Professor Ebel served the University in many ways. Besides two years as Chairman of the Physics Department, he spent eighteen years as Associate Dean of the Graduate School and represented the University on many national panels. Associate Dean Ebel was recognized nationally as an authority in the area of research administration. He served as chairman of the Council of Government Relations, as Principle Investigator for the University in the Federal Demonstration Project and as a member of numerous indirect cost study panels that have contributed to the prominence and reputation of the University.

Keith Symon (Ph.D. in 1948 from Harvard University) won the Particle Science and Technology Award for 2003, along with Dr. Stephen Milton. Since 1963, the IEEE Nuclear and Plasma Sciences Society has sponsored the biannual Particle Accelerator Conference. The 2003 PAC met in Portland, Oregon from May 12–16. Since 1989, a Particle Science and Technology Award has been presented at PAC to honor outstanding contributions to particle accelerator technology. The 2003 winners were Dr. Keith Symon, Emeritus Professor of Physics at the University of Wisconsin, Madison and Dr. Stephen Milton, Senior Scientist at Argonne National Laboratory. After that Keith Symon was on the faculty in the Physics Department of Wayne University, Detroit, MI, from 1947–1955. Then he joined the faculty of the Physics Department of the University of Wisconsin-Madison. In 1990 he was made Emeritus Professor of Physics. He also was a staff member of the Midwestern Universities Research Association (MURA), 1956–67, and technical director, 1957–60. He was chairman of Argonne Accelerator Users Group, 1961–62, acting director of the Madison Academic Computing Center, 1982–83, and of the UW-Madison Synchrotron Radiation Center, 1983–85.

He has been a most productive research physicist working in the areas of the design of particle accelerators and plasma physics. Besides inventing FFAG accelerators, he developed the smooth approximation method for approximating the solutions of differential equations with periodically varying coefficients, formalized the theory of radio-frequency acceleration in fixed field accelerators, and contributed greatly to the development of colliding beam techniques. He was among the first to develop the theory of collective instabilities in accelerators (a subject that has spawned one thousand papers). He also contributed to the linearized analysis of inhomogeneous plasma equilibria and developed a method of bit pushing and distribution pushing techniques for the numerical solution of the equations employed in both plasma physics and the study of collective instabilities in accelerators (the Vlasov equation). He was an outstanding supervisor of graduate students, having been the major professor for twenty graduate students gaining Ph.D.s from the UW-Madison. He was author of Mechanics, a popular undergraduate textbook, Addison-Wesley, 1953, 3rd Ed., 1971.



Keith Symon

Dr. Symon is cited for many fundamental accelerator concepts which include invention of Fixed Field Alternating Gradient Accelerators (FFAG), most notably incorporated into spiral sector cyclotrons; for defining a formalism describing motion under the influence of RF as required for stacking and other particle manipulations; and for techniques for analyzing collective instabilities.

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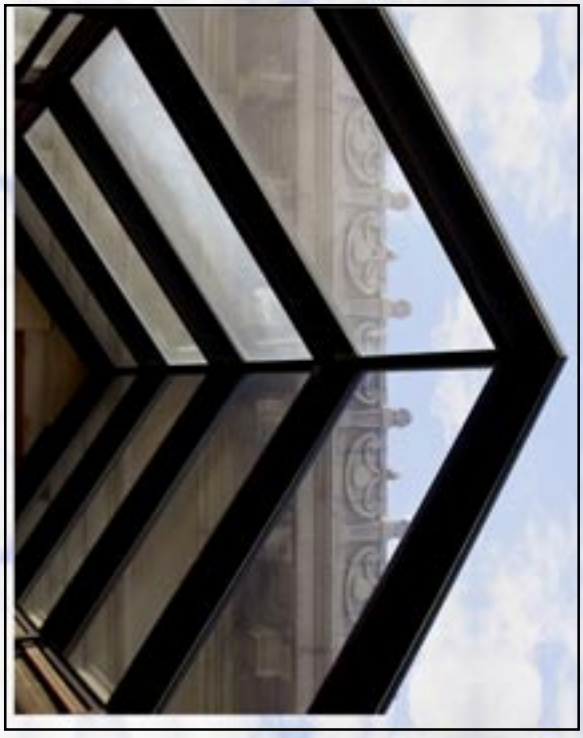

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